FluctLight Equation for the Brain: and basically all geometric fields.

By Ethan G Appleby

Core flow:

$$Y_{j,\sigma}(k,t) \to C^{obs}*{j,S}(k,t) \to C^{mix}*{i,S}(k,t) \to \tilde{C}_{i,S}(k,t) \to \tilde{B}_{i,\sigma}(k,t) \to \rho_i(t) \to V_e(t)$$

Index structure:

$$r_i \in \mathbb{R}^d,\ \sigma \in \{\pm 1\}^d,\ S \subseteq \{1,\dots,d\},\ \xi_{\sigma,k} = (k/\sqrt{d})\sigma,\ \chi_S(\sigma) = \prod_{a\in S} \sigma_a$$

Geometry:

$$\square \subset \mathbb{R}^d \to \mathbb{1}_\square(r_i) \to H_\square(\xi) = \int_\square e^{-i\xi\cdot x}\,dx \to T_\square(\xi) = \overline{H_\square(\xi)} / (|H_\square(\xi)|^2 + \lambda_H)$$

Local channel-to-moment transform:

$$Y_{j,\sigma'}(k,t) \to C^{obs}*{j,S}(k,t) = \Sigma*{\sigma'\in\{\pm 1\}^d} \chi_S(\sigma')Y_{j,\sigma'}(k,t)$$

Spatial brain coupling:

$$C^{obs}*{j,S}(k,t) \to C^{mix}*{i,S}(k,t) = \Sigma_j \Lambda_{ij,S}(k,t)C^{obs}_{j,S}(k,t)$$

Presynaptic / moment gating:

$$C^{mix}*{i,S}(k,t) \to \Gamma*{i,S}(k,t) = |C^{mix}*{i,S}(k,t)|^2 / (|C^{mix}*{i,S}(k,t)|^2 + \lambda_{i,S}(k,t)) \to \tilde{C}_{i,S}(k,t) = \Gamma_{i,S}(k,t)C^{mix}_{i,S}(k,t)$$

Moment-to-channel inverse transform:

$$\tilde{C}_{i,S}(k,t) \to \tilde{B}_{i,\sigma}(k,t) = 2^{-d} \Sigma_{S\subseteq\{1,\dots,d\}} \chi_S(\sigma)\tilde{C}_{i,S}(k,t)$$

Local source reconstruction:

$$\tilde{B}_{i,\sigma}(k,t) \to \rho_i(t) = \mathbb{1}_\square(r_i)\ \mathrm{Re}[\Sigma_k \Sigma_{\sigma\in\{\pm 1\}^d} T_\square(\xi_{\sigma,k})\tilde{B}_{i,\sigma}(k,t)e^{i\xi_{\sigma,k}\cdot r_i}]$$

EEG / sensor readout:

$$\rho_i(t) \to V_e(t) = \Sigma_i L_{ei}\rho_i(t)$$

Full monolithic left-to-right equation:

$$Y_{j,\sigma'}(k,t)$$

$$\to \Sigma_{\sigma'} \chi_S(\sigma')Y_{j,\sigma'}(k,t)$$

$$\to \Sigma_j \Lambda_{ij,S}(k,t)\Sigma_{\sigma'}\chi_S(\sigma')Y_{j,\sigma'}(k,t)$$

$$\to \Gamma_{i,S}(k,t)\Sigma_j\Lambda_{ij,S}(k,t)\Sigma_{\sigma'}\chi_S(\sigma')Y_{j,\sigma'}(k,t)$$

$$\to 2^{-d}\Sigma_S\chi_S(\sigma)\Gamma_{i,S}(k,t)\Sigma_j\Lambda_{ij,S}(k,t)\Sigma_{\sigma'}\chi_S(\sigma')Y_{j,\sigma'}(k,t)$$

→ 𝟙_□(rᵢ)Re[Σ_kΣ_σ e^{i((k/√d)σ)·rᵢ} · overline(H_□((k/√d)σ))/(|H_□((k/√d)σ)|²+λ_H) · 2^{-d}Σ_Sχ_S(σ)Γ_{i,S}(k,t)Σ_jΛ_{ij,S}(k,t)Σ_{σ′}χ_S(σ′)Y_{j,σ′}(k,t)]

→ V_e(t) = Σ_i L_{ei}ρ_i(t)

Single-line total equation:

V_e(t) = Re[Σ_i L_{ei}𝟙_□(rᵢ)Σ_kΣ_{σ∈{±1}^d} e^{i((k/√d)σ)·rᵢ} · overline(H_□((k/√d)σ))/(|H_□((k/√d)σ)|²+λ_H) · 2^{-d}Σ_{S⊆{1,…,d}}χ_S(σ)Γ_{i,S}(k,t)Σ_jΛ_{ij,S}(k,t)Σ_{σ′∈{±1}^d}χ_S(σ′)Y_{j,σ′}(k,t)]

Compact operator line:

Y → W Y → Λ W Y → ΓΛWY → W^{-1}ΓΛWY → T_□W^{-1}ΓΛWY → 𝟙_□Re[□^{-1}_holoT_□W^{-1}ΓΛWY] → L𝟙_□Re[□^{-1}_holoT_□W^{-1}ΓΛWY] = V

Ultra-compact brain equation:

V = L · 𝟙_□ · Re[□^{-1}_holo · T_□ · W^{-1} · Γ · Λ · W · Y]

Key promotion:

λ → Λ_{ij,S}(k,t)

Meaning:

input neural channels → Walsh moments → physical-space brain mixing → presynaptic gating → hyperocta

nt reconstruction → geometry transfer → source field → EEG readout